**Mayra Allen**

**Water, Energy, and Waste: Integrating Themes of Sustainability into Your Classroom**

**Summer 2012**

**Course Instructor: Shakira Castronovo**

**Second Lesson Plan**

**Description**:

Students will learn how to roughly calculate their own carbon footprint. In previous lessons, students will have learned about different sources of energy. In this lesson, they will be able to identify things that use more energy than others. Lastly, there is a calculation assignment that will help them see how much energy they are consuming and then think of different ways to reduce their carbon footprint.

**Topic**: Calculating and Reducing Energy Usage and Carbon Footprint

**Grade Level**: Grade 4 and up

**Time**: 45-60 minutes

**Standards**:

**NYC Science Scope and Sequence**:

**LE 7.1a.b** Describe the way that humans:

* Depend on their natural and constructed environment.
* Have changed their environment over time.

**LE 7.1b,c** Identify examples where human activity has had a beneficial or harmful effect on other organisms.

**NY State Social Studies Standards:**

Fourth Grade Expectations:

* explore the rights and responsibilities of citizens.
* expands such civics concepts as power, equality, justice, and citizenship.

Fourth Grade Social Studies Content Understandings:

* Citizenship includes rights and responsibilities that apply to the classroom, school, home, and local community.
* Effective, informed citizenship involves duties such as voting, jury service, and other service to the local community.

**Mathematics NY State Common Core Standards:**

**Operations and Algebraic Thinking**

* Use the four operations with whole numbers to solve problems.
* Gain familiarity with factors and multiples.
* Generate and analyze patterns.

**Numbers and Operations in Base Ten**

* Generalize place value understanding for multi-digit whole numbers.
* Use place value understanding and properties of operations to perform multi-digit arithmetic.

**Measurement and Data**

* Represent and interpret data.

**Teacher Professional Development Standards:**

Danielson Competency:

**Domain 3c: Engaging Students in Learning:**

* Activities and assignments
* Instructional materials and resources

**Objectives:** Students will have the:

• Ability to understand how energy usage and emissions can be calculated through mathematics.

• Understanding of where the most energy is consumed.

• Knowledge of energy sources and alternatives.

• Grasp of how their impact/footprint compares with others locally and globally.

**Materials**:

Energy Calculation Investigation Sheet- mainly electronic appliances

Calculators

Scrap paper and pencils

**Vocabulary**:

Carbon Footprint: The amount of carbon emissions a person produces.

Renewable vs. nonrenewable resources

Watts

**Procedure**:

Motivation:

* Review vocabulary words. (Taught in previous lessons) Include visuals for visual learners.
* Draw a web and ask students to name where energy comes from.
* Explain to the class how we use energy in our everyday lives. This includes not only our homes but in school, as well as in activities including sports, church, eating, driving, cooking.
* Tell them that today they will find out how much energy they use in their everyday lives.

Direct Modeling:

* Using the “Energy Calculation Investigation Sheet” model how to multiply the number of watts per hour times the hours per day used to get a total of how much energy is used.

Active Engagement:

* Students will use the rest of the “Energy Calculation Investigation Sheet” to find out how much energy they use daily.

***To differentiate***: Allow students to use a calculator if they are struggling with the multiplication portion.

* Have students share out loud with the rest of the class their energy, mainly electricity, usage.

Closing

* Last, after calculating electricity usage and which devices/appliances use the most energy have the students decide and write about one item each day they think they can try to live without. This will help them see firsthand how much energy they are saving and the tangible difference they are making.

Homework Assignment: Students can find out their carbon footprint by using a Carbon Footprint calculator and find out ways that they can reduce it to make a difference.

<http://www.cooltheworld.com/kidscarboncalculator.php>

Lesson Adapted from <http://rechargecolorado.org/images/uploads/pdfs/EnergyCROPLessonPlan-4thGradeLevel.pdf>

**NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Energy Calculation Investigation**

**Directions**: Use this chart to calculate your family’s energy use.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Appliance** | **Watts per**  **hour** | **X** | **Hours per**  **Day** | **=** | **Total** |
| Refrigerator | 700 |  |  |  |  |
| Microwave | 2100 |  |  |  |  |
| 24 inch TV | 125 |  |  |  |  |
| Video Games | 20 |  |  |  |  |
| DVD Player | 30 |  |  |  |  |
| Electric Clock | 4 |  |  |  |  |
| Clock Radio | 5 |  |  |  |  |
| Washing Machine | 1150 |  |  |  |  |
| Dryer | 5750 |  |  |  |  |
| Ceiling Fan | 75 |  |  |  |  |
| 14 inch Computer  Color Monitor | 100 |  |  |  |  |
| 60 Watt Bulb (each) | 60 |  |  |  |  |
|  |  |  |  | Total Energy |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rubric for Lesson Two | | | | |
|  | **4**  **(Above Standard)** | **3**  **(Meets Standard)** | **2**  **(Approaches Standard)** | **1**  **(Far Below Standard)** |
| **Independence** | Student completed the activity independently. | Student completed activity with minimal teacher assistance. | Student required moderate teacher assistance and prompting to complete the activity. | Student required a great deal of teacher assistance and prompting to complete the activity. |
| **Attention and Engagement** | Student remained engaged throughout the activity and was able to assist classmate(s) in need of support. | Student was engaged throughout the activity with no more than one verbal cue to remain on-task. | Student required 2-3 verbal reminders to remain engaged and on- task throughout the activity. | Student required more than 4 verbal reminders and wasn’t focused to remain on-task throughout the activity. |
| **Student Understanding** | Student understands how to calculate energy use, can explain in detail the purpose of this data collection, and has come up with great ways to reduce their own energy usage. | Student understands how to calculate energy use and can explain the purpose of this data collection. | Student has an incomplete understanding of how to calculate their everyday energy use and somewhat understands how this can help him/her make a change locally. | Student has a difficult time calculating energy use and does not recognize how this can help him/her make a change locally and globally. |